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ABSTRACT

Assuming that pupil involvement in academic learning activities (involved time) is a behavioral indicator of pupil learning, this study examined two context variables (subject area, day of the week) one instructional variable (activity format) and one pupil variable (previous achievement growth) in relation to pupil involved time. Individual pupil behavior was observed in fourth grade classrooms and coded according to type of academic activity and activity format (individual, group) during language arts, math, science, and social studies. Differences in involved time were found for subject area, day of the week, and achievement growth. The results were discussed in terms of their implications for making more effective use of allocated instructional time. (Author/MP)

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Instructional, Context, and Individual Differences in Pupil Involvement in Learning Activity*

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Abstract

Assuming that pupil involvement in academic learning activities (involved time) is a behavioral indicator of pupil learning, this study examined two context variables (subject area, day of the week), one instructional variable (activity format), and one pupil variable (previous achievement growth) in relation to pupil involved time. Individual pupil behavior was observed in fourth grade classrooms and coded according to type of academic activity and activity format (individual, group) during language arts, math, science, and social studies. Differences in involved time were found for subject area, day of the week, and achievement growth. The results were discussed in terms of their implications for making more effective use of allocated instructional time.

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Instructional, Context, and Individual Differences in Pupil Involvement in Learning Activity

Pupil involvement in academic learning activities (involved time) has been shown to be significantly related to achievement test performance. (Anderson, 1975; Arlin & Roth, 1978; Bloom, 1974; Cooley & Leinhardt, 1978; Fisher, Filby, Marliave, Cahen, Dishaw, Moore, & Berliner, 1978; Lahaderne, 1968; Samuels & Turnure, 1974; Stallings & Kaskowitz, 1974). Assuming that pupil learning is enhanced to the extent that pupils are engaged in relevant activities, involved time can be viewed as an indicator of pupil learning. Also, as an overt behavioral indicator of ongoing learning, involved time is a nonreactive measure of instructional effectiveness.

Although the relationship between pupil involved time and achievement has been amply documented, factors influencing involved time remain largely unexplored. Identification of such factors would facilitate the design of strategies for maximizing instructional effectiveness. In this study, context, instructional, and pupil variables are examined in relation to involved time. Additionally, pupil involved time in different academic activities and formats is examined.

Context variables are aspects of the setting or environment in which instruction occurs. The context variables of interest here are subject area (language arts, including reading; math; science; and social studies) and day of the week. In most elementary schools, more time is allocated to language and math than to science and social studies. Because science and social studies activities usually occur less often and for shorter

periods of time, their relative novelty might be appealing to pupils. Consequently, pupil involved time might be greater in science and social studies than in the more familiar and frequent language and math. Also, it seems reasonable to expect that pupil involved time would be greatest in mid-week; there would be less involved time at the beginning of the week when assignments are being made and pupils are "getting started" and at the end of the week when pupils are "finishing up" and perhaps anticipating the weekend.

Instructional variables are features of classroom learning activities. Here, the focus is on the format (large group, small group, individual) of academic activities. It seems likely that pupil involved time would be greater in large group activities where the teacher can regularly monitor pupil behavior than in small group or individual activities where the teacher can only periodically do so (Fisher et al., 1978; Gump, 1971).

In addition to context and instructional variables, individual pupil differences are likely to affect involved time. Pupils with high prior achievement growth (AG) are likely to be more motivated and less distractible than low AG pupils and, consequently, might be expected to show greater involved time. Data consistent with this expectation are provided by several studies that found more involved time among high than low achievement level pupils (Anderson, 1975; Arlin & Roth, 1978; Shimron, 1974).

AG also might interact with activity format, with high AG pupils showing a greater proportion of involved time than low AG pupils in large group compared to individual and small group activities. In individual, in contrast to large group format activities, pupils can complete asssignments in

different amounts of time. High AG pupils would likely need less time to complete individual assignments than would low AG pupils and, thereby, remain involved for a smaller proportion of the time allocated for individual format activities.

On the basis of these considerations, the following hypotheses are examined: (a) subject area is related to involved time, with greater involved time occurring in science and social studies than in language and math; (b) day of the week is related to involved time, with greater involved time occurring in the middle than at the beginning and end of the week; (c) academic activity format is related to involved time, with the proportion of involved time being greater in large group than in other activity formats; (d) pupil AG is related to involved time, with high AG pupils showing more involved time than low AG pupils; and (e) pupil AG interacts with academic activity format, with high AG pupils showing a greater proportion of involved time than low AG pupils in large group than in other activity formats. Also examined are the possible effects of subject area, day of the week, and pupil AG on pupil involved time in different academic activities and formats.

Method

The sample consisted of fourth grade pupils in four classrooms in two urban elementary schools serving an integrated, working class community. High and low achievement growth (AG) pupils were identified in each classroom. AG was defined as a pattern of continuous growth during the previous two years in the Total Reading grade-equivalent score on the Stanford

Achievement Tests. Extremely low AG pupils (those who showed no AG) were excluded from the sample as were pupils for whom achievement data were incomplete (i.e., pupils who had been attending school in the district for less than three years).

In each of the four classrooms, two high and two low AG pupils were selected for observation. When a target pupil was absent, an AG appropriate alternate was observed. Of the 26 pupils who met the AG criteria, 21 were observed on one or more occasions. There was a total of 108 pupil observations (54 high and 54 low AG). The mean AG for the high pupils was 2.38; for lows, it was .81. AG was not significantly related to pupil race or sex.

Pupil behavior was assessed during 30 observation periods distributed across academic subject areas (language arts, math, science, social studies), days of the week, and the four classrooms. (During the time period of the study, science and social studies were not scheduled on Fridays. In addition, classroom schedule changes precluded observation of science on Wednesdays and social studies on Tuesdays.) The observation periods were usually of 30 minutes duration, but were shorter when a subject area lesson continued for less than half an hour.

Individual pupil behavior was coded on a minute-by-minute basis during each observation period, according to activity format (individual, small group, large group) and type of academic or nonacademic activity. Management (e.g., disciplinary), transitional (e.g., putting away supplies), and other (e.g., walking around) activities were coded as nonacademic. Twenty-one different academic activities and eight activity combinations (e.g., viewing

a diagram on the chalkboard during a recitation) were distinguished and then grouped into 10 categories. Interobserver agreement was 97 percent for involved time, 97 percent for activity format, and 91 percent for activity type.

The 10 academic activity categories and the activities in each category are:

Reading (reading-silent, reading-oral, reading-silent + listening)

Writing (writing-copying, writing-worksheet, reading-silent + writing-worksheet, viewing + writing-worksheet)

Creating (writing-divergent, viewing + writing-divergent, reading-silent + writing-divergent)

Listening and/or Viewing (listening, viewing, listening + viewing)

Recitation (recitation-listening, recitation-speaking, recitation-listening + viewing, speaking)

Discussion (discussion-listening, discussion-speaking)

Projects or Games (game, project, listening + project, roleplaying, art)

Quizzes

Conferences with the Teacher

Other (checking work, work-related conversation with another pupil, other)

The following scores were obtained for each pupil observation: involved time, the proportion of observed time that the pupil was engaged in academic activity; three format time scores, the proportion of observed time that the pupil spent in each academic activity format; and ten activity time scores, the proportion of observed time that the pupil spent in each academic activity category.

Two additional format scores were obtained for each pupil observation during those observation periods in which both large group and small group or individual format academic activities occurred. These format involvement scores are: large group format involvement, the proportion of teacher allocated time for large group academic activities that the pupil was engaged; and other format involvement, the proportion of teacher allocated time for small group and individual academic activities that the pupil was engaged.

Results

Involved Time

The involved time results were analyzed using a three-way (AG x subject x day) ANOVA. The means for pupil involved time by subject area and day of the week are presented in Table 1.

Insert Table 1 about here

The AG effect was not significant. Involved time did not differ significantly for high and low AG pupils. Also, the AG x subject and AG x day effects were not significant.

The subject area effect was significant ($F(3,76) = 4.64$, $p < .005$). Involved time was greater in science and social studies (74 percent) than in language and math (64 percent), ranging from 61 percent in language to 80 percent in social studies.

The day of the week effect was not significant. However, the subject x day interaction was significant ($F(12,76) = 2.57$, $p < .007$). Involved time in science and social studies increased gradually during the week, while involved time in language showed a steady decline from Monday to Thursday followed by a slight increase on Friday. Involved time in math showed a more variable pattern, increasing from Monday to Tuesday, declining dramatically by Thursday, and increasing again on Friday.

Format Involvement

The format involvement results were analyzed using a two x two ANOVA with one between group factor (AG) and one within group factor (format). The mean involvement scores by format and AG are presented in Table 2.

Insert Table 2 about here

The AG effect was significant ($F(1,33) = 5.10$, $p < .03$), with high AG pupils showing greater involvement than low AG pupils. Thus, while involved time did not differ by AG across all pupil observations, there was a significant AG difference in those classes that included both large group and other format activities.

The format effect was not significant. Although there was greater involvement in large group than in other format activities, the difference was not significant. Also, the format x AG interaction was not significant. Activity format was not differentially related to the involvement scores of high and low AG pupils.

Format and Activity Time

A three-way (AG x subject x day) multivariate analysis of variance was used to examine differences in pupil involved time in the three activity formats and in the 10 activity categories. The means by subject area and day of the week are presented for format time in Table 3 and for activity time in Table 4.

Insert Tables 3 and 4 about here

The multivariate results for format and activity time were similar. For both, neither the AG effect nor the AG x subject and AG x day interactions were significant. However, there were significant effects for subject area (format, $F(3,76)= 7.29$, $p < .001$; activity, $F(3,76)= 5.68$, $p < .001$), day of the week (format, $F(4,76)=4.26$, $p < .001$; activity, $F(4,76)= 2.63$, $p < .001$), and subject x day interaction (format, $F(12.76)= 2.77$, $p < .001$; activity, $F(12,76)= 2.29$, $p < .001$).

Subject area. The results for format time in the subject areas show that generally pupils spent proportionally more time in individual format activities in language and math than in science and social studies; pupils spent more time in large group format activities in science and social studies, particularly the latter.

Differences in activity time by subject area were found for all of the academic activity categories except listening-viewing, quizzes, conferences, and other academic activities. Generally, pupils spent proportionally more time in writing activities in language and math than in science and social studies. Recitation activity time was highest in

science and social studies, particularly the latter; time in reading activities was highest in science and language, creating in language, discussion in science and social studies, and projects and games in math.

Day of the week. The results for format time for the days of the week show proportionally more time in individual format activities on Monday, Wednesday, and Friday than on Tuesday and Thursday. More large group format time was found on Tuesday and Thursday.

Differences in activity time by day of the week were found in writing, discussion, and project and game activities. Time in writing activities was proportionally greater on Monday, Wednesday, and Friday, whereas discussion activity time, though infrequent, occurred mostly on Tuesday and Thursday. Projects and games, which also were infrequent, appeared mostly on Tuesday and Friday.

Subject x day. The subject x day interaction results for format time revealed more time in large group format activities in math and science on Tuesday and in social studies on Thursday, with minimal large group format time in language across all of the days of the week. More time in individual format activities was found in language and math on Monday, Wednesday, and Friday, in social studies on Wednesday, and in science on Thursday.

A subject x day interaction for activity time was found for writing, recitation, discussion, projects and games, and other academic activities. There was less time in writing activities in science and social studies, particularly on Monday and Tuesday. Also in science and social studies,

there was more recitation activity time, particularly on Monday and Thursday, and more discussion activity time, particularly on Tuesday and Thursday. Time in project and game activities appeared primarily in math on Tuesday while other academic activity time occurred in language and social studies on Wednesday and in math and science on Thursday.

Discussion

Across all pupil observations, pupils were involved in academic learning activities 67 percent of the time. This result is similar to those reported in other studies (e.g., Fisher et al., 1978).

As hypothesized, pupil involved time varied significantly by subject area. The difference in involved time between language and social studies was especially striking. Overall, the subject areas having more allocated time (language and math) showed proportionally less pupil involved time. A possible implication is that further increasing allocated time in language and math, as some have advocated (e.g., Council for Basic Education), would have a negligible effect on involved time. Thus, to increase pupil learning in these subject areas, it might be more productive to make better use of already allocated time than to extend existing time allotments. Better use of time might include the use of different types or patterns of academic activities.

The hypothesis that day of the week would be related to pupil involved time, with greater involved time occurring in the middle than at the beginning and end of the week, was

not confirmed. However, day of the week was differentially related to involved time, depending upon the subject area. While the less frequently offered science and social studies subjects showed a pattern of increasing involved time across the days of the week, language and math showed patterns of decreasing pupil involvement, particularly between Tuesday and Thursday.

As do the subject area results, these findings suggest that to increase pupil learning, at least in the more frequently occurring and longer lasting language and math areas, it might be preferable to focus on more effective use of time than on allocating more time. In this regard, it is interesting to note that, in language and math, Thursday rather than Friday was the low point for pupil involvement. This finding raises the possibility that teachers might anticipate less pupil motivation on Fridays and thus plan activities for Friday that are more likely to engage pupils. The activity time results for language and math do suggest different activity patterns on Friday. For example, time in creating, conferences with the teacher, and projects and games was greater on Friday than on Thursday.

Academic activity format was not found to be related to pupil involved time. Contrary to expectation and the findings of Fisher et al. (1978) and Gump (1971), involvement was not significantly greater in large group than in other format activities, although the results were in the anticipated direction. The considerable variability in format involvement scores, especially for individual format, suggests that other instructional features of an activity influence pupil involvement. For example, the substance and motivational features of a specific activity would

likely affect pupil involved time. It seems reasonable to expect that such an effect would be greater for self-paced, individual activities than for teacher-paced, group activities. Thus, future studies of the effect of activity format on involved time might consider other activity characteristics in conjunction with format.

Although high AG pupils were expected to show greater involved time than low AG pupils, involved time did not differ by AG across all pupil observations. A possible explanation of this result is that while high AG pupils might be more motivated and less distractible than low AG pupils, they also are likely to be more capable and thus need less time to complete assignments. Having completed individual assignments sooner than low AG pupils, high AG pupils would not necessarily show greater involved time unless they could move on to the next task without waiting for the other pupils. Although there was some evidence of differentiation of assignments among pupils in the observed classes, generally pupils could not progress at their own rates. In contrast, in classrooms where pupils could move on to the next assignment as soon as they were ready for it, high achievement pupils showed more involved time than low achievement pupils (Shimron, 1974).

Although there was no AG difference in involved time across all pupil observations, high AG pupils showed significantly greater involvement than low AG pupils during the observation periods that included more than one activity format. High AG pupils were more involved than low AG pupils when there was some change or variety in activity format. It may

be that change is appealing to high AG pupils and that low AG pupils spend more time in transition from one activity to another. Also, when more than one activity format occurred during an observation period, typically large group activities were followed by other format activities, and individual assignments not completed in class were to be completed as homework. In these situations, high AG pupils appear to make better use of the allocated class time.

The hypothesized AG x format interaction was not found. It appears that when large group and other format activities occur within a 30 minute period of instruction, high AG pupils show more involvement in both activity formats than do low AG pupils.

The format and activity time results indicate what pupils actually do during academic instruction. The predominance of writing activities, particularly those involving various types of worksheets, is especially noteworthy. More than one-third of the pupils' academic activity time was spent completing worksheets. A similarly high percentage of writing activities has been observed in sixth grade classrooms (Good & Beckerman, 1978). Recitation activities accounted for the next highest proportion of pupil activity time and were most common in science and social studies. In contrast, relatively little time was spent in reading activities (5 percent overall and only 8.5 percent in language arts).

The activity time results also are suggestive of the types of academic activities that might be associated with greater pupil involved time. Examination of the distribution of activity time for the subjects

and days with the most and least involved time reveals that certain activities -- creating, discussion, projects and games -- tend to occur primarily during periods of high involved time. Overall, these activities accounted for approximately 10 percent of academic activity time. They differ from the other activities in that they are divergent activities that typically entail more physcially and/or intellectually active pupil participation. Whether greater pupil involved time would be obtained with increased use of more divergent and participatory activities, however, remains to be investigated.

In sum, instructional variables (e.g., activity type, nature of curriculum materials) and their interaction with context and pupil variables seem worthy of further investigation. Assuming that involved time reflects pupil learning, greater understanding of how specific instructional features in different contexts with different pupils might affect involved time would facilitate the development of strategies for maximizing pupil learning.

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Table 1

Mean Pupil Involved Time by Subject Area

and Day of the Week

Day of the Week	Language	Math	Science	Social Studies	Total
Monday	75.01	67.08	56.67	75.00	69.31
Tuesday	61.67	94.17	64.59	-	70.52
Wednesday	54.45	75.45	-	87.10	69.62
Thursday	52.50	44.89	73.33	84.17	62.40
Friday	58.75	68.08	-	-	63.42
Total	60.79	67.12	66.55	79.75	

Table 2

Mean Involvement by Format and AG

	Large Group Format	Other Format	Total
Low AG	76.63	61.73	69.18
High AG	87.21	75.52	81.36
Total	81.77	68.43	

Table 3

Mean Pupil Format Time in Individual, Small Group, and Large Group Activities by Subject Area and Day of the Week

	Language	Math	Science	Social Studies	Total
Monday					
Individual	65.83	64.17	31.67	35.72	54.56
Small Group	9.17	2.92	0	0	4.03
Large Group	0	0	25.00	39.29	10.71
Tuesday					
Individual	40.88	13.33	9.38	-	26.12
Small Group	20.79	9.17	0	-	12.69
Large Group	0	71.67	55.21	-	31.72
Wednesday					
Individual	44.45	63.66	-	56.04	52.96
Small Group	6.67	1.79	-	12.22	6.88
Large Group	3.33	10.00	-	18.84	9.78
Thursday					
Individual	27.50	39.78	55.55	15.42	34.10
Small Group	7.50	3.56	0	0	2.99
Large Group	17.50	5.56	17.78	68.75	26.32

Table 3 - continued

Mean Pupil Format Time in Individual, Small Group, and Large Group Activities by Subject Area and Day of the Week

	Language	Math	Science	Social Studies	Total
Friday					
Individual	53.33	39.67	-	-	46.50
Small Group	5.42	20.92	-	-	13.17
Large Group	0	7.50	-	-	3.75
Total					
Individual	46.50	47.13	36.73	30.52	42.79
Small Group	10.08	7.29	0	4.63	6.88
Large Group	4.21	12.69	29.82	44.60	17.25

Table 4

Mean Pupil Activity Time in 10 Academic Activity Categories

by Subject Area and Day of the Week

	Reading	Writing	Creating	Listening -Viewing	Recita-tion	Discus-sion	Project -Game	Quiz	Confer-ence	Other
Language	8.50	27.32	5.66	4.00	5.71	0	2.68	2.42	2.26	2.82
Mon	13.25	50.63	5.00	0	2.13	0	0	0	.38	4.88
Tues	8.38	21.13	1.88	0	19.25	0	6.00	0	2.63	2.13
Wed	10.17	15.50	14.50	3.33	0	0	0	0	5.33	5.67
Thurs	4.88	12.75	0	16.50	5.75	0	0	11.50	.38	0
Fri	6.25	33.63	9.13	0	0	0	6.75	0	3.38	2.13
Math	.79	35.63	0	1.29	7.55	1.11	10.00	3.50	4.21	5.63
Mon	1.63	49.13	0	0	0	0	7.50	0	7.00	5.00
Tues	0	19.25	0	9.75	0	10.50	51.75	0	.75	2.50
Wed	1.38	53.38	0	1.25	12.50	0	0	0	4.75	2.13
Thurs	.60	30.40	0	0	6.10	0	0	4.70	2.60	11.90
Fri	0	19.13	0	0	15.75	0	14.13	10.75	4.63	3.50

Table 4 - continued

Mean Pupil Activity Time in 10 Academic Activity Categories

by Subject Area and Day of the Week

	Reading	Writing	Creating	Listening -Viewing	Recita- tion	Discus- sion	Project -Game	Quiz	Confer- ence	Other
Science	9.93	21.64	0	.86	20.07	10.07	0	1.43	1.43	4.29
Mon	10.25	8.25	0	0	33.25	0	0	0	1.75	3.25
Tues	17.00	0	0	3.00	9.50	35.25	0	0	0	0
Wed	-	-	-	-	-	-	-	-	-	-
Thurs	6.67	40.00	0	0	19.00	0	0	6.67	1.00	9.00
Fri	-	-	-	-	-	-	-	-	-	-
Social St	5.61	17.44	.22	6.33	37.72	9.28	0	.17	.56	4.28
Mon	13.25	24.25	1.00	3.00	32.00	0	0	0	1.00	0
Tues	-	-	-	-	-	-	-	-	-	-
Wed	8.67	39.00	0	4.33	21.67	0	0	1.00	1.00	11.33
Thurs	0	1.75	0	10.38	55.88	20.88	0	0	0	0
Fri	-	-	-	-	-	-	-	-	-	-

Table 4 - continued

Mean Pupil Activity Time in 10 Academic Activity Categories

by Subject Area and Day of the Week

	Reading	Writing	Creating	Listening -Viewing	Recita- tion	Discus- sion	Project -Game	Quiz	Confer- ence	Other
Total	5.49	27.86	2.03	3.03	13.56	3.24	4.46	2.30	2.56	4.24
Mon	8.88	38.67	1.83	.50	11.58	0	2.50	0	2.92	3.83
Tues	8.44	15.38	.94	3.19	12.00	11.44	15.94	0	1.50	1.69
Wed	6.00	36.15	4.35	2.45	10.20	0	0	.15	3.80	6.40
Thurs	2.34	21.56	0	6.72	20.75	5.22	0	4.97	1.31	5.19
Fri	3.13	26.38	4.56	0	7.88	0	10.44	5.38	4.00	2.81